KUSTEL & SMITH.

Improvement in Roasting Ores.

No. 131,882. Patented Oct. 1, 1872.

Fig. 1.

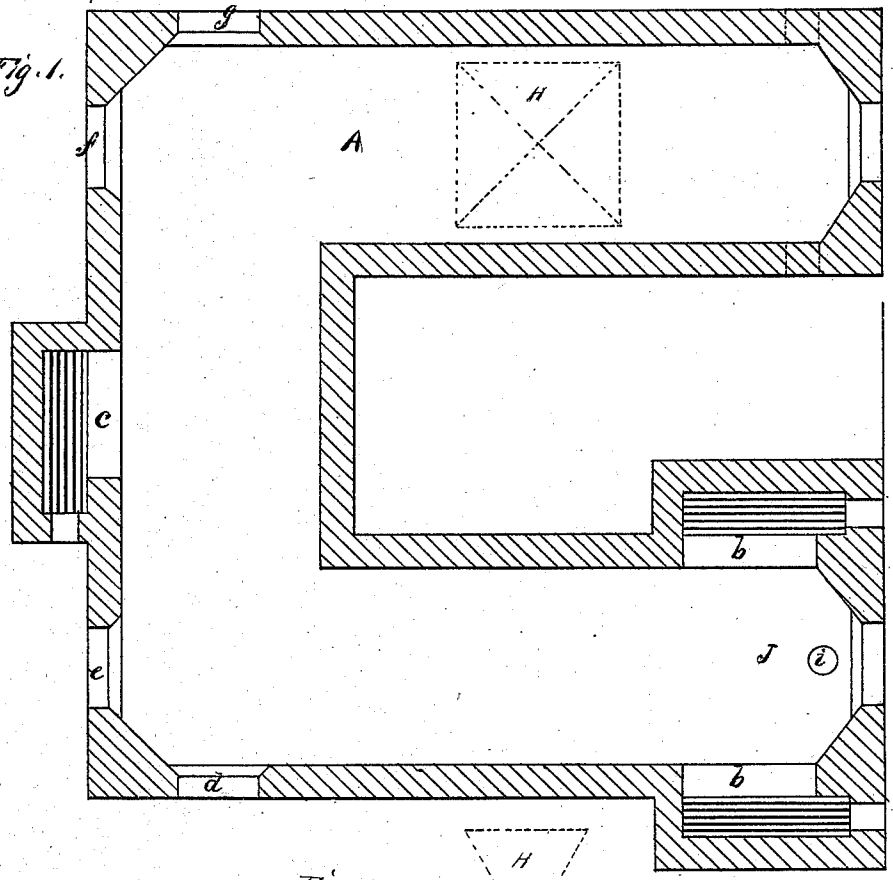
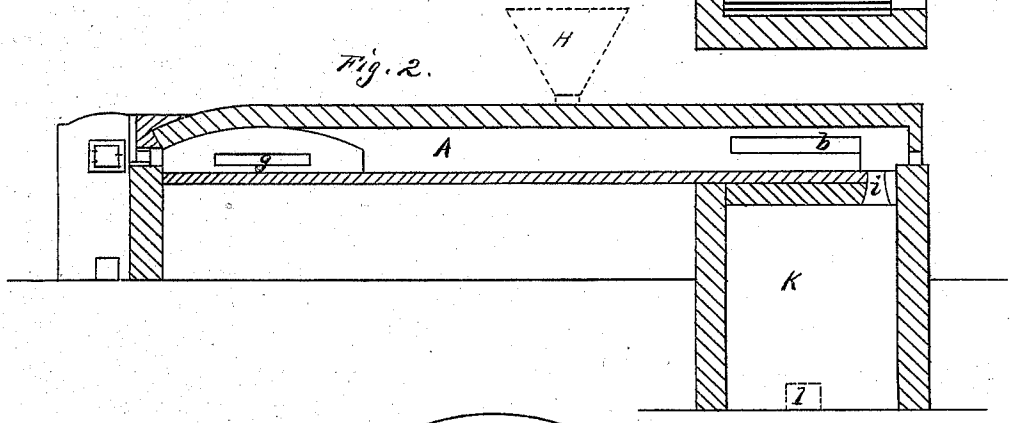
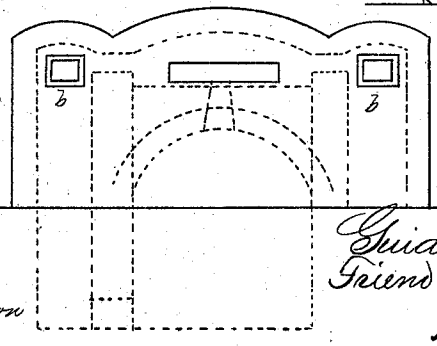


Fig. 2.





Witnesses

D. L. Borne

C. M. Richardson

Inventor

Guido Kustel

Friend W. Smith

per Dewey & Co

Attys

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

UNITED STATES PATENT OFFICE.

GUIDO KUSTEL, OF SAN FRANCISCO, CALIFORNIA, AND FRIEND W. SMITH, OF ELLSWORTH, NEVADA.

IMPROVEMENT IN ROASTING ORES.

Specification forming part of Letters Patent No. **131,882**, dated October 1, 1872.

To all whom it may concern:

Be it known that we, GUIDO KUSTEL, of San Francisco, California, and FRIEND W. SMITH, of Ellsworth, Nye county, State of Nevada, have invented Improvements in Ore-Roasting Furnaces; and we do hereby declare the following description and accompanying drawing are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use our said invention or improvements without further invention or experiment.

Our invention relates to improvements in reverberatory roasting-furnaces. Our improvements consist, first, in so constructing the furnace that the labor of stirring the ore, in order to expose it to the action of the heat, is greatly lessened; and, secondly, in providing a chamber into which the heated ore can be raked and left in large quantities, in order to complete the chlorination.

In order to more fully illustrate and explain our invention, reference is had to the accompanying drawing forming a part of this specification, in which—

Figure 1 is a horizontal section; Fig. 2 is a longitudinal section; and Fig. 3 is an end view.

The first part of our invention is accomplished by extending the length of the furnace in a zigzag or irregular form, and placing fire-places at intervals along its length, so that the ore can be raked in one direction through the furnace, parallel with the length of the hearth, by placing the doors in the position hereinafter described. Generally we prefer to construct the furnace as in the drawing, in which A represents a furnace constructed in the form of three sides of a square, having at one end the fire-places *b b* and a supplemental or additional fire-place, *c*, at the middle of the furnace. *d*, *e*, *f*, and *g* are openings through which the operator works when raking the ore. These openings or doors are so placed that the line of the length of each hearth passes the doors on both ends. The feed-opening H is placed at the end of the furnace opposite the fire-places *b b*, and when the ore is fed upon the hearth it is raked or drawn along the bottom of the furnace in a straight line, first toward the opening *f*, then past the fire-place *c* toward the opening *d*, and thence toward the fire-places *b b*. Between the fire-places *b b*, at the discharge-end of the furnace, is a hearth, J, through which an opening, *i*, leads to a chamber, K, beneath.

When the ore has arrived upon this hearth it is allowed to drop through the opening *i* into the chamber K until a quantity amounting to three or four tons has accumulated in the chamber. This mass of ore is allowed to remain in a red-hot condition in this chamber, evolving chlorine, and continuing the chlorination of any silver which might have escaped this action in passing over the hearth. All of the chlorine and volatile chlorides which are thus freed will rise through the opening *i* into the furnace, and will act decomposingly on the ore which is passing over the furnace. After three or four hours the roasted ore may be drawn out of the chamber K through the door *l*. This process is repeated, the charging of the furnace commencing as soon as the first charge has passed sufficiently along the hearth. The exact shape of the furnace is immaterial, as it may be made zigzag in any convenient manner, so as to form an extended hearth over which to pass the ores.

By this means we greatly reduce the labor of roasting the ore, and shorten the roasting of the charges by at least two hours, when compared with the ordinary roasting-furnace; besides, by allowing the hot ore to remain in mass in the chamber the chlorinating process continues, and the evolved gases are utilized in the reduction of the ore being operated upon, and it has been found that ores thus allowed to remain after roasting yield a much larger per cent. of silver in the final working.

The advantage of extending the furnace-hearth is to permit of the ores being roasted to be raked or drawn in one direction all of the time, thus avoiding the labor of stirring the mass back and forth.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. A reverberatory furnace, A, having its hearth extended in a zigzag or irregular form, and having the openings *d*, *e*, *f*, and *g*, substantially as and for the purpose described.

2. An irregular-shaped reverberatory fur-

nace, having openings *d*, *e*, *f*, and *g*, in combination with one or more supplemental fireplaces, C, substantially as and for the purpose described.

3. The chamber K, in combination with the furnace A, substantially as and for the purpose above described.

4. The process above described for roasting and chlorizing ores.

In witness whereof we have hereunto set our hands and seals.

GUIDO KUSTEL. [L. S.]
FRIEND W. SMITH. [L. S.]

Witnesses:
J. L. BOONE,
C. M. RICHARDSON.